• Julian Jacobs Architects

Noise Impact Assessment

Type of Document
Preliminary

Project Name
Embassy of the Republic of Iraq

Project Number
205359-A0

Prepared By: Kevin Murphy

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Date Submitted
August 17, 2012

Julian Jacobs Architects

Noise Impact Assessment

Type of Document:
Preliminary

Project Name:
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1 Introduction

Julian Jacobs Architects retained **exp** Services Inc. to undertake a noise impact assessment in support of a site plan application for a proposed embassy located at 215 McLeod Street in the City of Ottawa (See Figure 1 in Appendix A). The construction of this four storey building is adjacent to multiple arterial and collector roadways and a freeway which requires the completion of a noise impact study. This report addresses concerns with respect to anticipated noise levels at the proposed building resulting from traffic noise and makes recommendations based on the calculations obtained from noise prediction methods. This study was carried out in accordance with the Ontario Ministry of the Environment (MOE) and the City of Ottawa Noise Control Guidelines. The findings of the study will address noise levels, and recommend if noise abatement measures are necessary to bring noise levels to acceptable levels. This noise impact study is prepared to address the following conditions as identified in the City of Ottawa's Noise Control Guidelines:

> *Where a new development is proposed within 100m from the right-of-way of an existing or proposed road arterial, major collector or bus Transitway, 250 meters of an existing or proposed highway, light rail transit corridor or a secondary main railway line, or 500m from the right-of-way-of a freeway or 400-series provincial highway or a Principal Main railway line, the City will require a noise study to be prepared*.

2 References

A summary of the documents that were references during the preparation of this reports include the following:

- Ontario Ministry of the Environment publication LU-131, Noise Assessment Criteria in Land Use Planning, and accompanying Annex, dated October 1997.
- Ontario Ministry of the Environment publication NPC-205, Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban).
- Ontario Ministry of the Environment guideline D-6, Compatibility between industrial facilities and Sensitive Land Uses, July 1995.
- City of Ottawa Transportation Master Plan.
- City of Ottawa Environmental Noise Control Guidelines, May 10, 2006.
- Building Practice Note (BPN 56), Controlling Sound Transmission into Buildings, National Research Council Canada, dated Sept 1985.

3 Sound Level Criteria

Ministry of the Environment (MOE) requirements and the City of Ottawa Guidelines place limitations on indoor and outdoor sound levels from road traffic which are summarized in Table 3-1 below.

Table 3-1: MOE and City of Ottawa Indoor and Outdoor Criteria For Noise From Traffic.

Location, Space & Time Period	Equivalent Level Leq (dBA)
Indoors Sleeping quarters of residences, hospitals, schools, nursing / retirement homes, daycare centers, etc (Nightime 23:00 to 07:00)	40
Sleeping quarters of hotels/motels (Nightime 23:00 to 07:00)	45
Living / Dining areas of residences, hospitals schools, nursing/retirement homes, daycare centers, theatre, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms. (Daytime 07:00 to 23:00)	45
General offices, reception areas, retail stores, etc. (Daytime 07:00 to 23:00)	50
Outdoors Outdoor Living Areas (Daytime 07:00 to 23:00)	55

The basic physical measurement of noise used in this report is the A-weighted sound level measured in dBA, which is an overall measurement of sound over a full range of frequencies. Because noise from roadway traffic fluctuates over the audible range of hearing, it is convenient to describe noise in terms of an equivalent 24-hour sound level (denoted as Leq). MOE Guidelines require that traffic noise be evaluated in relation to specific locations during certain time periods.

Noise levels calculated (or predicted) at the Plane of the Window (POW) for a particular time period, either day-time or night-time, are used to dictate the action required to achieve the recommended indoor sound level requirements. The mitigation of the indoor sound levels are achieved by proper selection of building architectural components (walls, windows, doors), based on the noise reduction required.

Two methods are used for the evaluation of the building components requirement: the Acoustic Insulation Factor (AIF) and the Sound Transmission Class (STC). The STC method is the most commonly used rating method for sound transmission in North America, and therefore will be referenced in this report to help determine the window STC rating required to achieve indoor sound level requirements.

A review of the internal uses of the building was completed in order to determine the noise control requirements. In Appendix B, Floor plans and elevations of the proposed building are provided. The following is a summary of the uses on each floor:

- Ground Floor (1st Floor): Meeting rooms, offices, reception and visitor halls.
- 2nd Floor: Offices and meeting rooms.
- 3rd Floor: Multi-purpose hall.
- 4th Floor: Offices and meeting rooms.
- 5th Floor: Mechanical penthouse.

3.1 Vehicular Traffic Noise

Noise emanating from roadway and freeway traffic was accessed at the south, east and west façade of the proposed building (Refer to Figure 2 in Appendix A). In general, noise levels are predicted for outdoor living areas during the day and for indoor living areas during the day and bedrooms during the night time. However this proposed building does not have an amenity area that meets the definition of an outdoor living area (OLA). Also, the building does not include residential living/dining or sleeping areas. Therefore noise levels from roadway traffic were calculated for the POW during the daytime in order to determine only the indoor sound requirements.

3.2 Aircraft/Airport Noise

The site is located outside of the Airport Operating Influence Zone as per Annex 10 of the Ottawa Official Plan, Sept 2011. Therefore, noise from air traffic does not impact this site and will not be examined in this report.

3.3 Stationary Noise

A review of the surrounding building uses and the zoning of adjacent properties was completed in order to determine if there was a potential impact or influence from stationary noise sources (Refer to Appendix C for zoning information). Typical residential HVAC units are present approximately 50m from the proposed site. The land uses for these buildings are zoned as residential and therefore not classified as Class I, II, or III, as identified in MOE Guideline D-6. Based on the classifications, it was established that the noise emanating from these units are not classified as stationary noises sources.

4 Traffic Information

Traffic information used for this study was obtained from the review of existing roadway conditions and reference to the City of Ottawa's Noise Control Guidelines. In proximity to the site, a total of five roadways are within the required distance for noise impact evaluation as noted in Section 1. The roadway noise sources are as follows:

- Gladstone Avenue (within 40m)
- Metcalfe Street (within 60m)
- Elgin Street (within 90m)
- McLeod Street (within 12m)
- Queensway, Highway 417 (within 300m)

Of the five noise sources, Gladstone and Metcalfe were not used in the assessment due to shielding from adjacent buildings that are in close proximity to the roadway noise sources. The remaining three sources, McLeod and Elgin Streets and the Queensway were used. The Queensway was taken as 3 lanes in each direction and modeled using two separate segments, whereas McLeod and Elgin Streets were taken as one segment each. Road and traffic parameters used in our analysis are summarized in Table 1 below. Noise levels were calculated based on the noise emanating from these roadways.

Table 4-1: Traffic and Road Parameters (AADT Traffic Volumes)

Traffic Parameters	Queensway	McLeod Street / Elgin
R.O.W. WIDTH (m)	Varies	Approx 20 m
Roadway Classification	freeway	2-Lane Arterial Undivided (2-UAU)
A.A.D.T. (veh/day)	18,333/lane	15,000
POSTED SPEED LIMIT (km/hr)	100 km/hr	50 km/hr
Day/night split (%)	92 / 8	92 / 8
Medium trucks (%)	7	7
Heavy trucks (%)	5	5

5 Noise Prediction

All noise levels have been predicted using MOE's software and methodology. STAMSON Version 5.03 (1999), which is based on the Ontario Road Noise Analysis Method for Environment and Transportation ("ORNAMENT") Model, was used for all calculations in this report. Detailed output files are attached in Appendix D for reference.

In addition to the traffic data that was used in the analysis, theoretical noise predictions were based on the following information:

- Truck traffic on all streets and roadways consists of 5% heavy trucks, 7% medium trucks, based on City of Ottawa requirements.
- The Day/Night split used for roadways and freeways was 92% and 8% as per city requirements.
- Intermediate surfaces between the source and receiver locations was assessed as a reflective ground surface.
- Topography was assessed as flat/gentle slope.
- Road pavement and road gradient was assessed as typical asphalt or concrete and flat grade.

For all modelling with STAMSON, source and receivers were assumed to be elevated with a reflective separating surface. This ensures that no ground absorption is applied to the prediction results. Therefore when no ground absorption is applied, the predicted sound levels do not increase with the height of the receiver, and the results are the same for all floors. This is a conservative assumption which simplifies the prediction of sound levels on all floors.

Noise levels were assessed on three faces of the building. One receiver location located on the south face, one receiver on the east face and one receiver on the west face of the building.

6 Summary of Results

The predicted noise levels for the south, east and west façade of the proposed building are 73.2 dBa, 68.4 dBa and 65.6dBa respectively.

A summary of predicted noise levels for various assessment locations is summarized below in Table 6-1. Detailed results and output from Stamson Version 5.03 are contained in Appendix A.

Table 6-1: Summary of Noise Levels

Assessment Location	Combined Equivalent Noise Level Leq (dBa)	
	Day Time (7:00 – 23:00)	**Night Time (23:00 – 7:00)
South Building Facade	73.2	65.6
East Building Facade	68.4	60.8
West Building Facade	65.6	58.0

** Although night-time sound levels are provided, they were not used as there are no indoor sound level criteria requirements for night-time, as this proposed building has only general office spaces, etc, and no sleeping quarters, etc.

7 Recommendations

As this building is intended as a place of business and there are no living quarters, no building component, ventilation or warning clause requirements as a result of noise emanating from road traffic are necessary. Plane of the window (POW) noise levels were predicted in order to determine the indoor noise requirements only. As the predicted noise levels for the south, east and west façade of the proposed building exceed indoor sound level criteria of 50 dBa for the daytime period, proper selection of building components (windows, walls, doors) will be required to reduce indoor noise levels to acceptable levels.

It is recommended that a qualified (architectural) acoustic consultant determine the proper components necessary to achieve the required indoor noise requirement of 50 dBa.

No noise control requirements are necessary resulting from stationary noise sources, aircraft/airport noise. No noise control requirements are necessary for the Outdoor Living Areas (OLA).

The predicted noise levels for the south, east and west façade of the proposed building exceed the indoor sound level requirements of 50 dBa. Proper selection of building components (windows, walls, doors) will be required to reduce indoor noise levels to acceptable levels. The building components selected for the building will be required to meet the following requirements:

South façade components: Reduce predicted outdoor sound levels of 73.2 dBa to 50 dBa.

East façade components: Reduce predicted outdoor sound levels of 68.4 dBa to 50 dBa.

West façade components: Reduce predicted outdoor sound levels of 65.6 dBa to 50 dBa.

Appendix A – Figures

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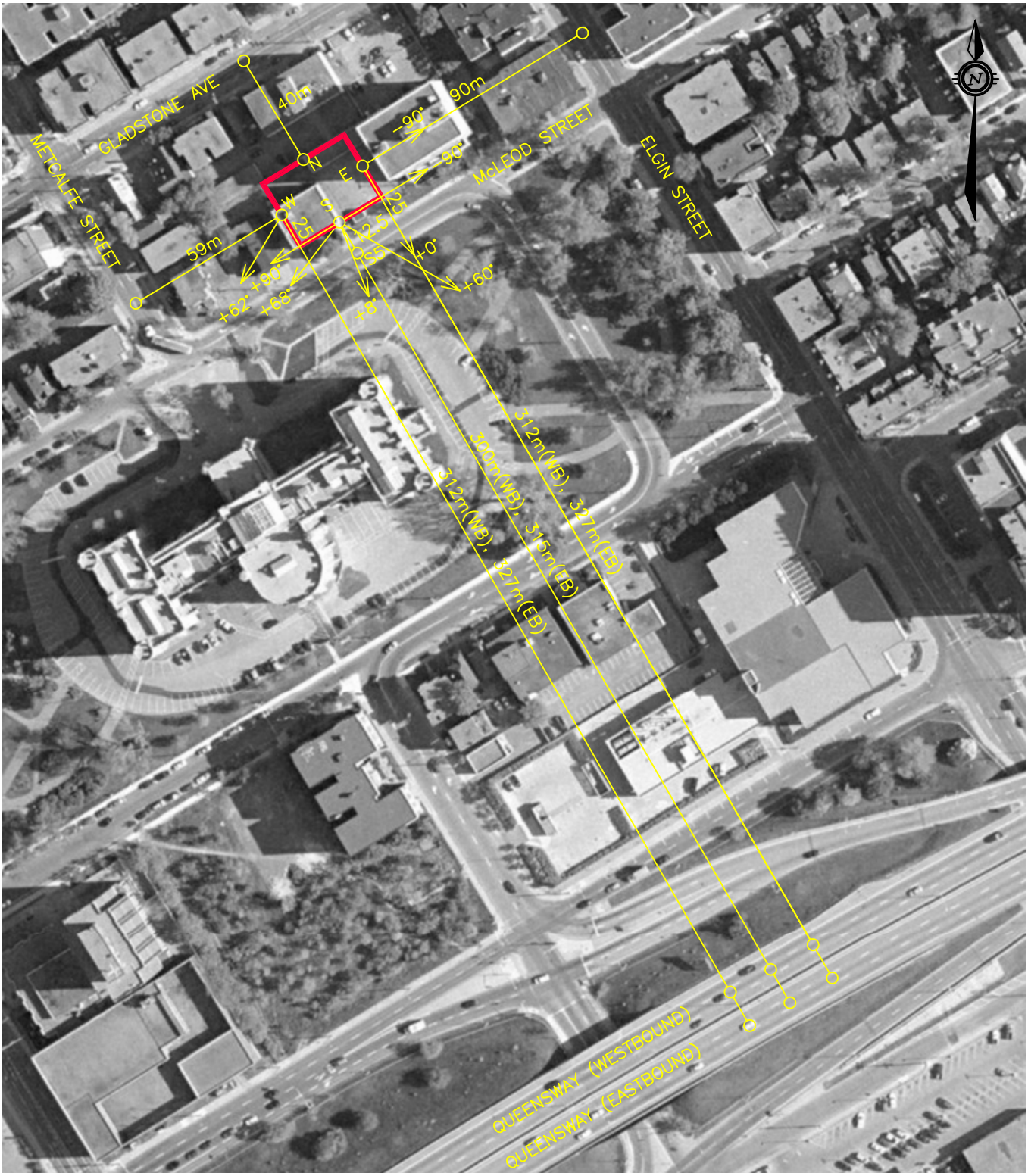
scale 1:5000	CLIENT: JULIAN JACOBS ARCHITECTS	project no. 205359–A0
date 27/03/02		
drawn by	TITLE: OVERALL SITE LOCATION	FIG1



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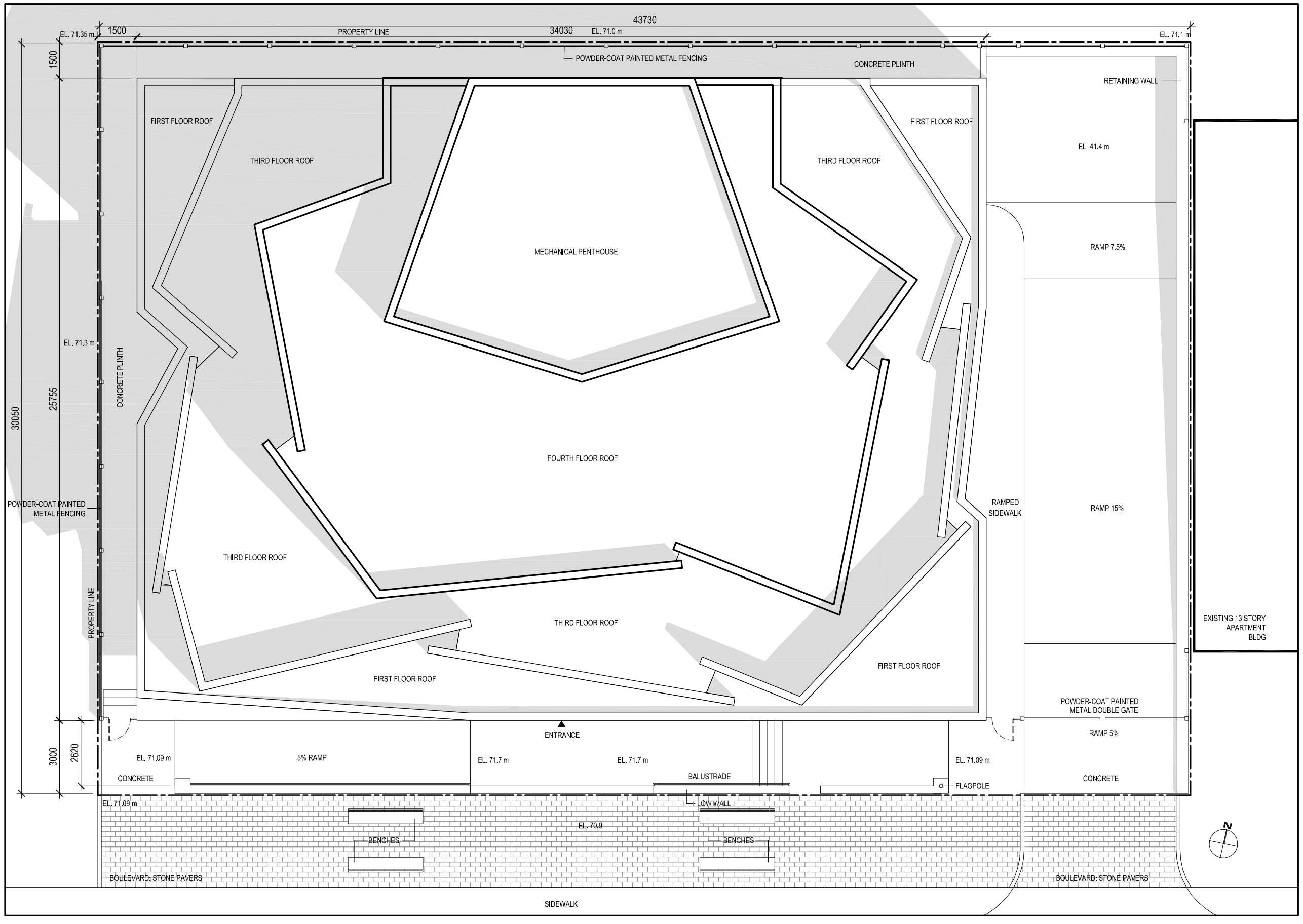
scale 1:2000	CLIENT: JULIAN JACOBS ARCHITECTS	project no. 205359–A0
date 27/03/02		
drawn by	TITLE: NOISE SOURCE, RECEIVER LOCATIONS	FIG2

Appendix B – Architectural Drawings



CONCEPTUAL SITE PLAN

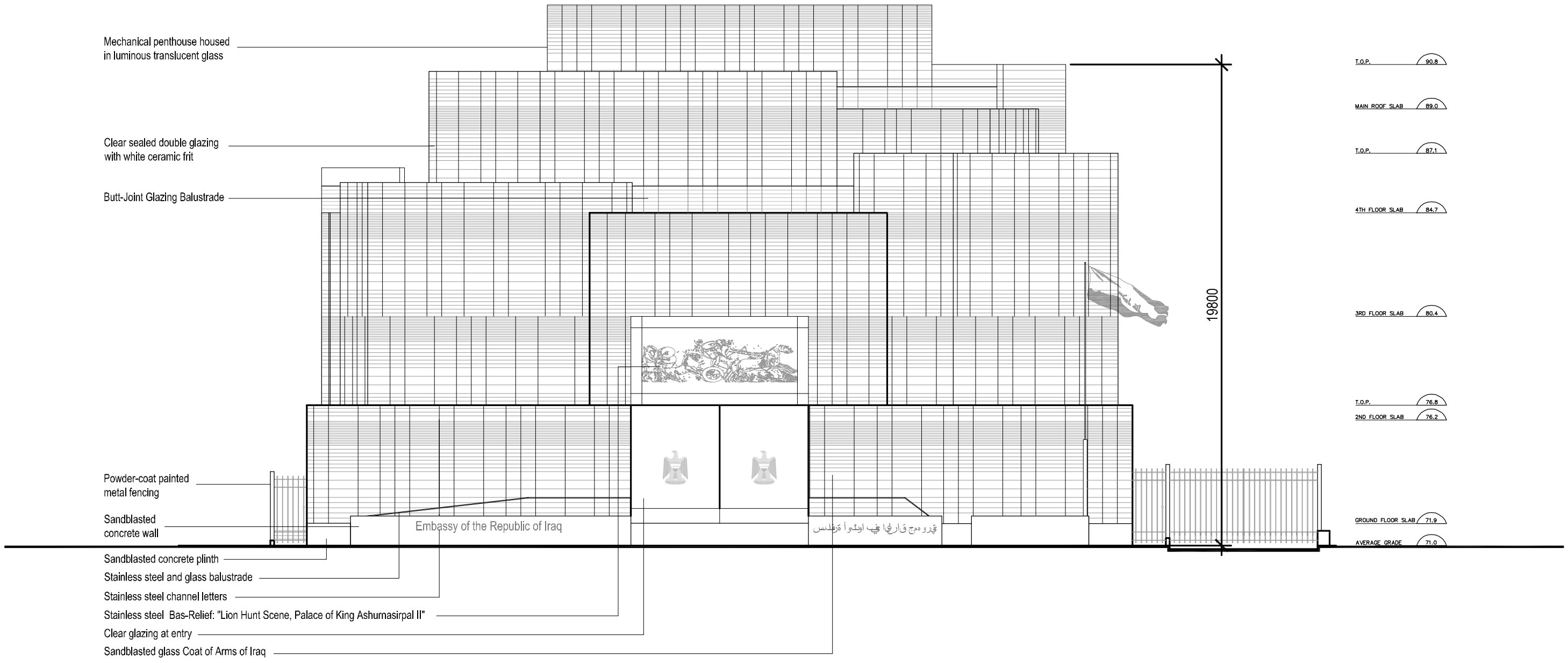
JUNE 2012

EMBASSY BUILDING

EMBASSY OF THE REPUBLIC OF IRAQ

SCALE: 1 : 150

JULIAN JACOBS ARCHITECTS



CONCEPTUAL SOUTH/ FRONT ELEVATION

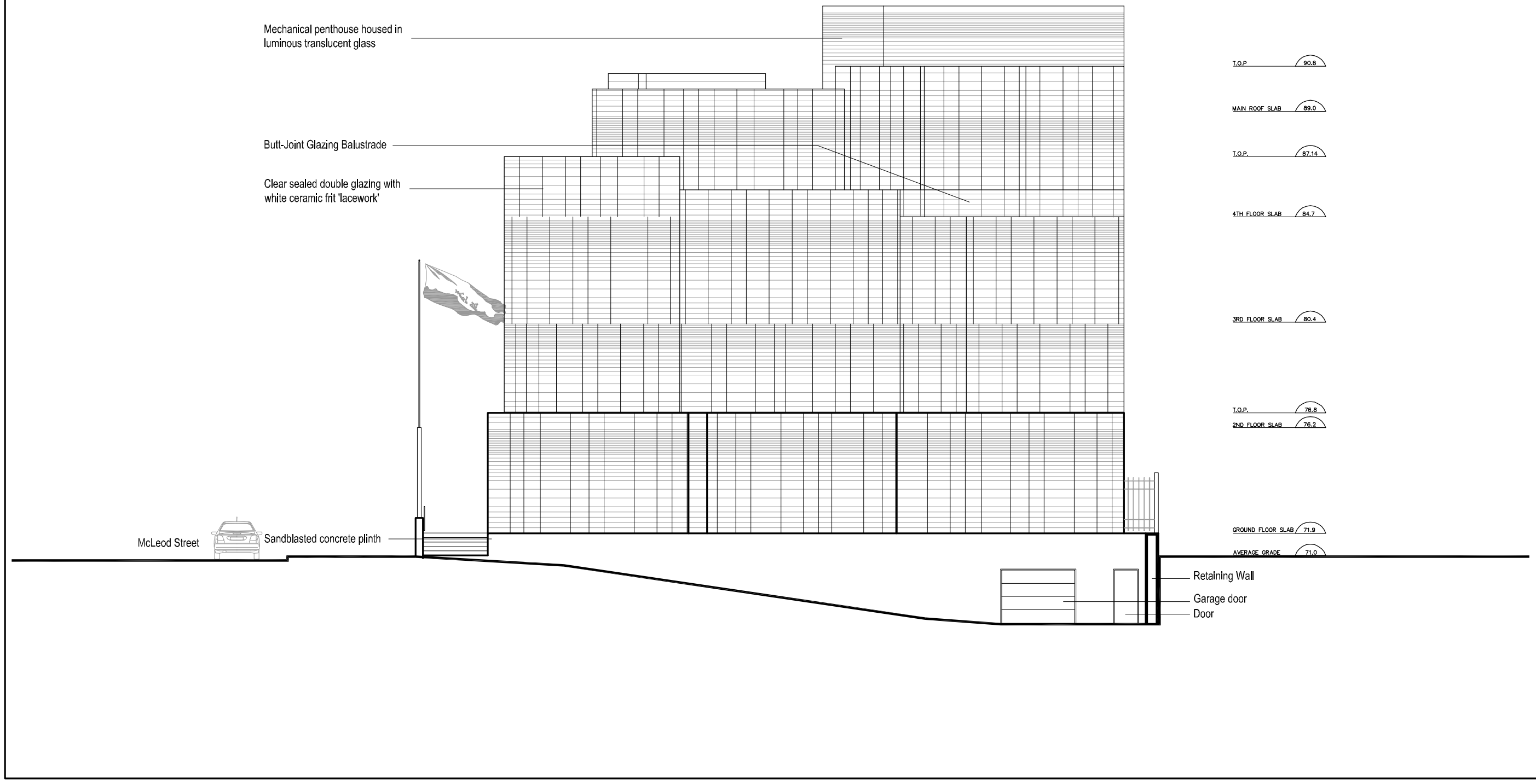
JUNE 2012

EMBASSY BUILDING

EMBASSY OF THE REPUBLIC OF IRAQ

SCALE: 1 : 75

JULIAN JACOBS ARCHITECTS



CONCEPTUAL EAST ELEVATION

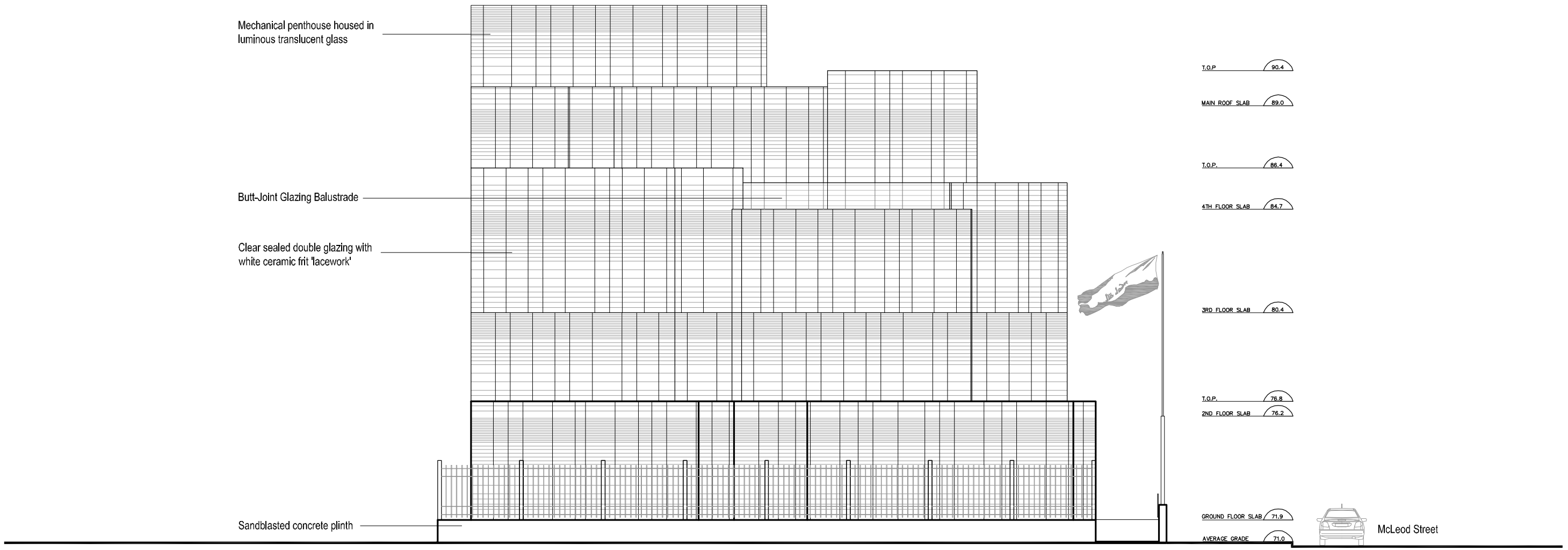
JUNE 2012

EMBASSY BUILDING

EMBASSY OF THE REPUBLIC OF IRAQ

SCALE: 1 : 75

JULIAN JACOBS ARCHITECTS



CONCEPTUAL WEST ELEVATION

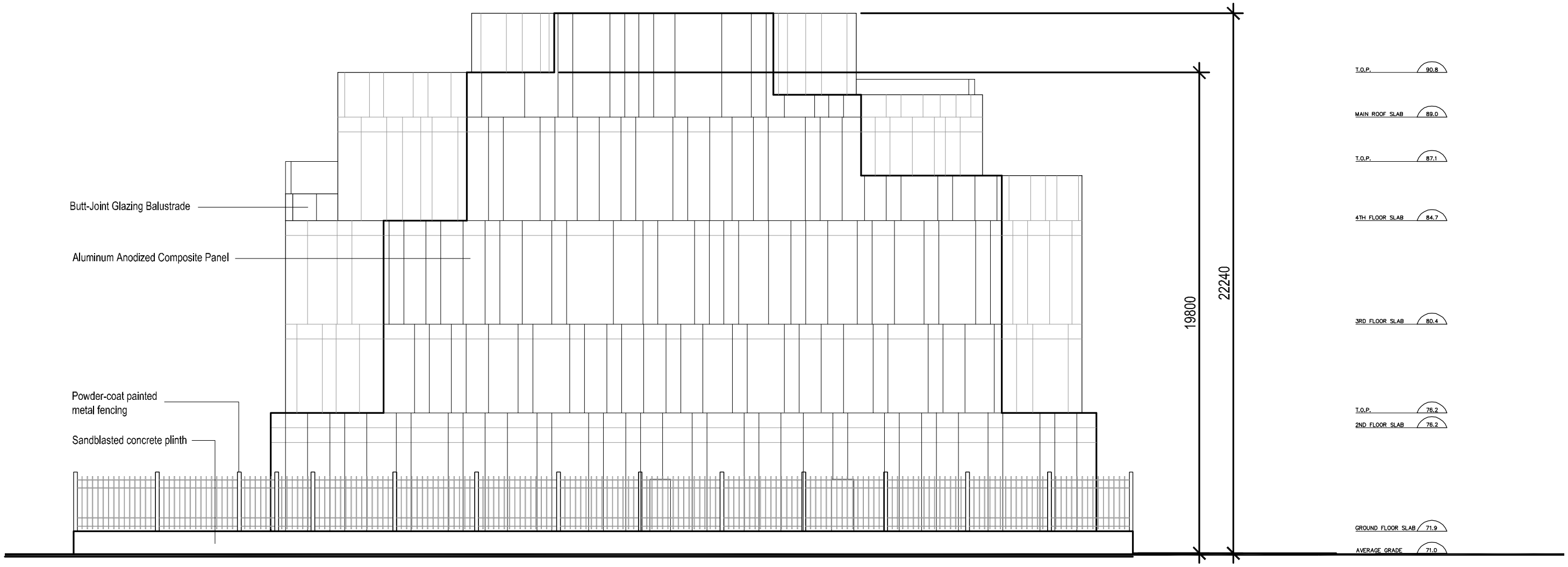
JUNE 2012

EMBASSY BUILDING

EMBASSY OF THE REPUBLIC OF IRAQ

SCALE: 1 : 75

JULIAN JACOBS ARCHITECTS



CONCEPTUAL NORTH/ REAR ELEVATION

JUNE 2012

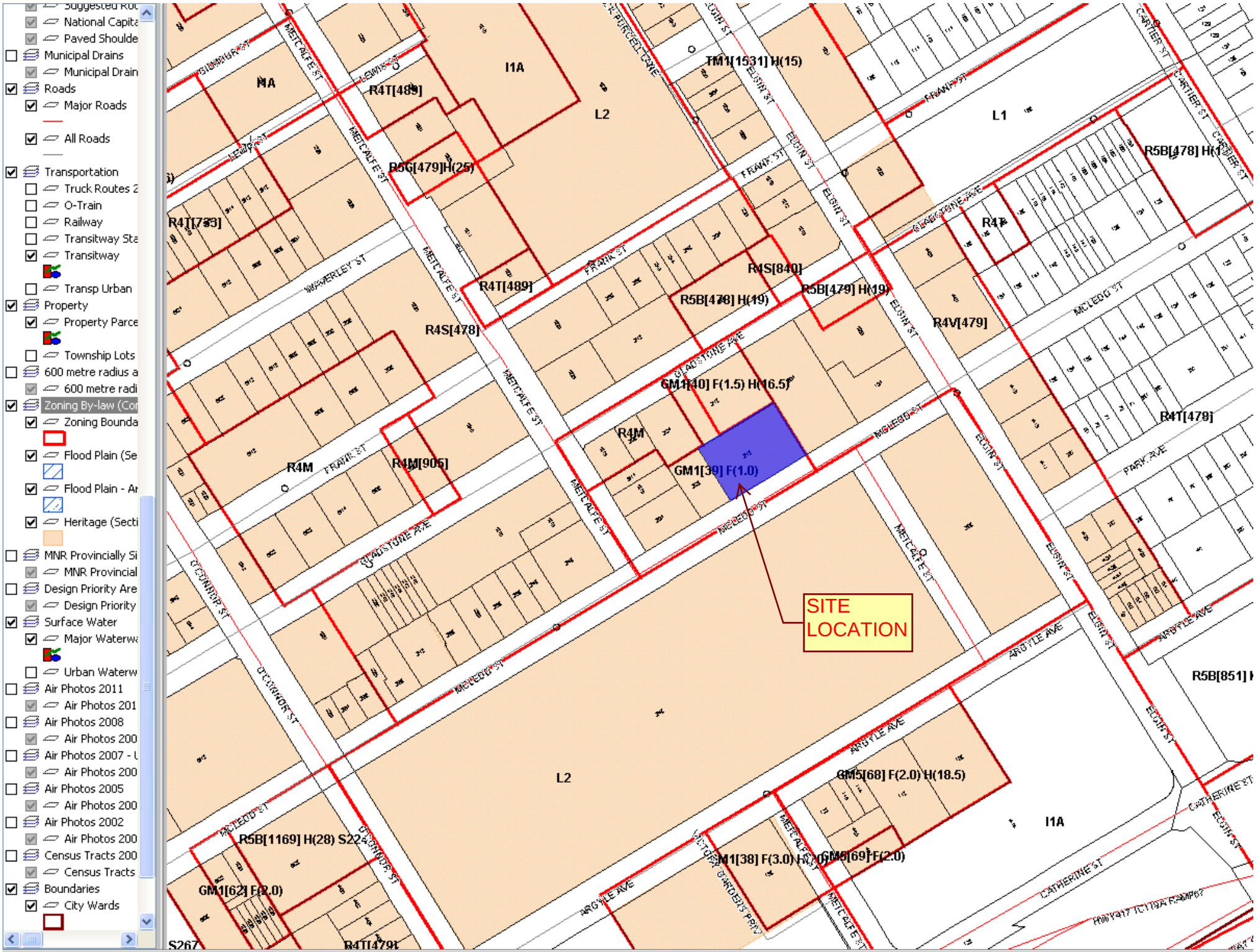
EMBASSY BUILDING

EMBASSY OF THE REPUBLIC OF IRAQ

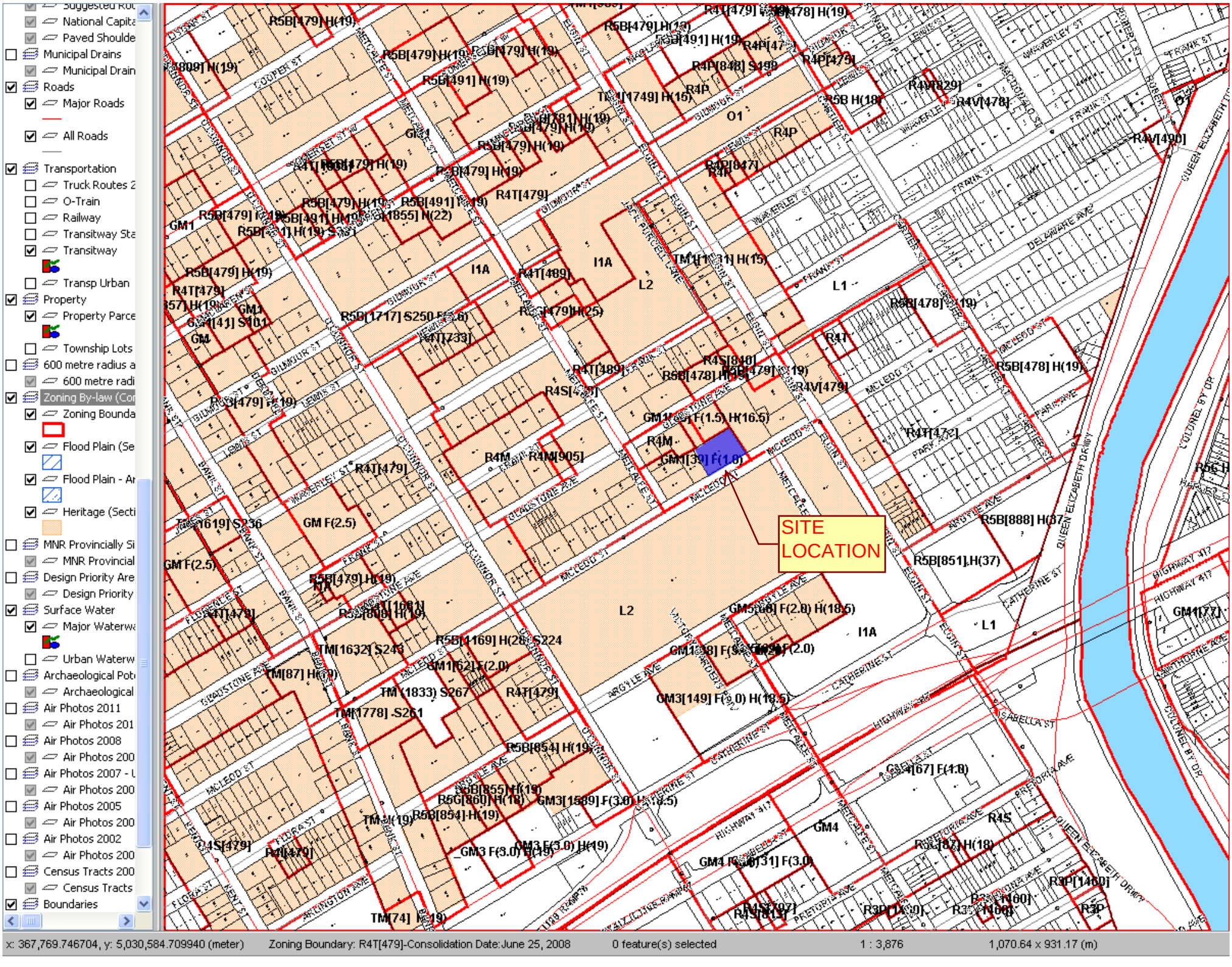
SCALE: 1 : 75

JULIAN JACOBS ARCHITECTS

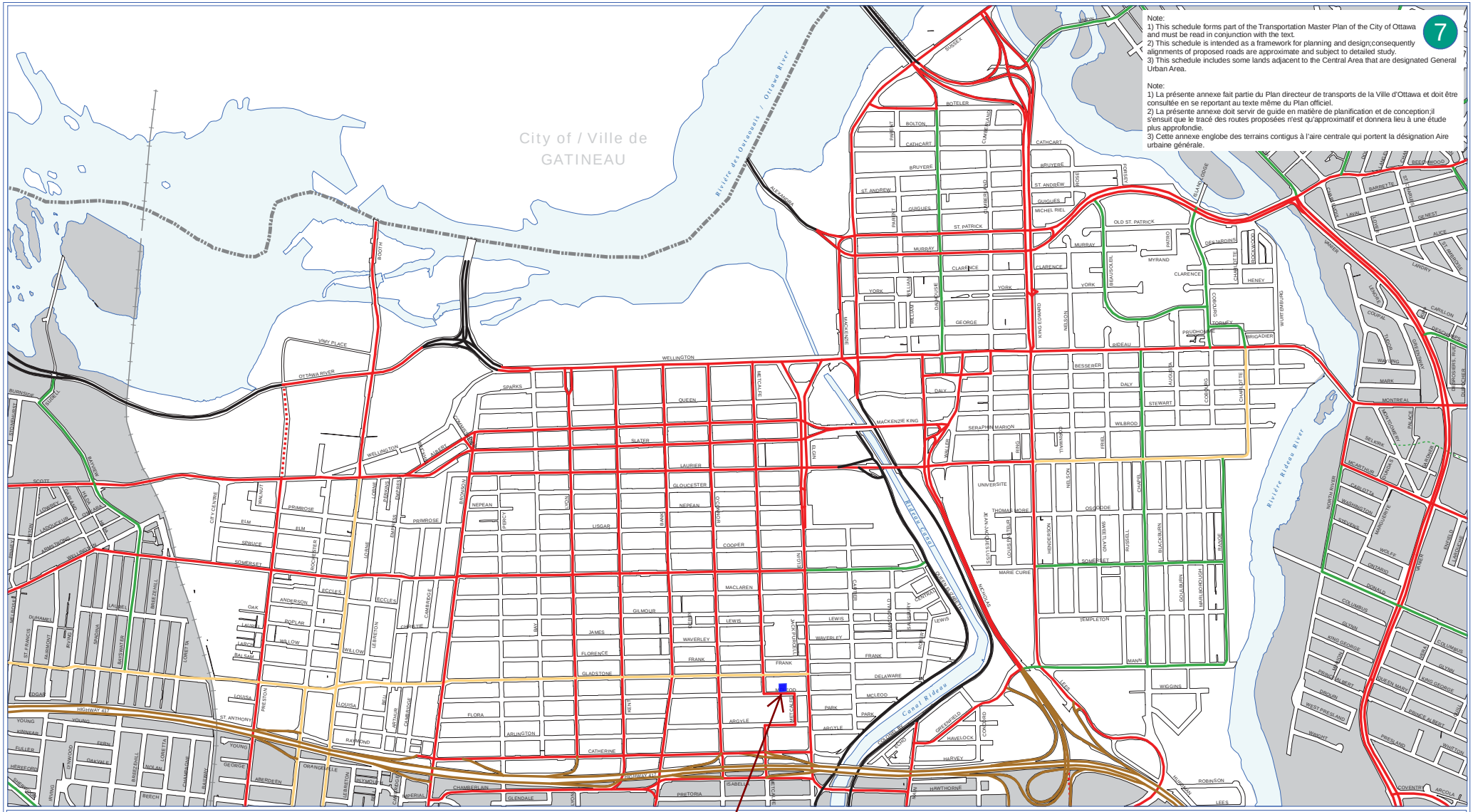
Appendix C – Zoning, Road Network



x: 368,054.839693, y: 5,030,824.166560 (meter) Zoning Boundary: R4S[478]-Consolidation Date:June 25, 2008 0 feature(s) selected 1 : 1,938 535.32 x 465.59 (m)



x: 367,769.746704, y: 5,030,584.709940 (meter) Zoning Boundary: R4T[479]-Consolidation Date:June 25, 2008 0 feature(s) selected 1 : 3,876 1,070.64 x 931.17 (m)



Note:
1) This schedule forms part of the Transportation Master Plan of the City of Ottawa and must be read in conjunction with the text.
2) This schedule is intended as a framework for planning and design;consequently alignments of proposed roads are approximate and subject to detailed study.
3) This schedule includes some lands adjacent to the Central Area that are designated General Urban Area.

Note:
1) La présente annexe fait partie du Plan directeur de transports de la Ville d'Ottawa et doit être consultée en se reportant au texte même du Plan officiel.
2) La présente annexe doit servir de guide en matière de planification et de conception;il s'ensuit que le tracé des routes proposées n'est qu'approximatif et donnera lieu à une étude plus approfondie.
3) Cette annexe englobe des terrains contigus à l'aire centrale qui portent la désignation Aire urbaine générale.

7

TRANSPORTATION MASTER PLAN - Map 7
CENTRAL AREA / INNER CITY ROAD NETWORK

PLAN DIRECTEUR DES TRANSPORTS - Carte 7
AIRE CENTRALE / RÉSEAU ROUTIER DE L'HYPERCENTRE

SITE LOCATION
215 MCLEOD ST

Provincial Highway	Route provinciale
Federally Owned Road	Chemins de propriété fédéral
Arterial - Existing	Artère - Établie
Arterial - Proposed (alignment defined)	Artère - Proposé (alignement déterminée)
Major Collector - Existing	Grande collectrice - Établie
Collector - Existing	Collectrice - Établie

Ottawa

0.1 0.05 0 0.1 0.2 0.3 Kilometers

Prepared by: City of Ottawa, Department of Infrastructure Services and Community Sustainability, November 2008
Preparé par: Ville d'Ottawa, Le Services d'infrastructure et Viabilité des collectivités, novembre 2008

Appendix D – Stamson Output

STAMSON 5.0 NORMAL REPORT Date: 02-04-2012 14:36:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: south.te Time Period: Day/Night 16/8 hours
Description: SOUTH FACADE

Road data, segment # 1: QUEENSWAY-WB (day/night)

Car traffic volume : 44528/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 55000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: QUEENSWAY-WB (day/night)

Angle1 Angle2 : -90.00 deg 8.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 300.00 / 300.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: QUEENSWAY-WB (day/night)

Car traffic volume : 44528/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 55000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: QUEENSWAY-WB (day/night)

Angle1 Angle2 : 68.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 300.00 / 300.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: QUEENSWAY-EB (day/night)

Car traffic volume : 44528/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 55000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: QUEENSWAY-EB (day/night)

Angle1 Angle2 : -90.00 deg 8.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 315.00 / 315.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: QUEENSWAY-EB (day/night)

Car traffic volume : 44528/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 55000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00

Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: QUEENSWAY-EB (day/night)

Angle1 Angle2 : 68.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 315.00 / 315.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: MCLEOD (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 5: MCLEOD (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: ELGIN (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 552/48 veh/TimePeriod *
Heavy truck volume : 773/67 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 7.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 6: ELGIN (day/night)

Angle1 Angle2 : 0.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: QUEENSWAY-WB (day)

Source height = 1.50 m

ROAD (0.00 + 64.50 + 0.00) = 64.50 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 8 0.00 80.15 0.00 -13.01 -2.64 0.00 0.00 0.00 64.50

Segment Leq : 64.50 dBA

Results segment # 2: QUEENSWAY-WB (day)

Source height = 1.50 m

ROAD (0.00 + 58.01 + 0.00) = 58.01 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
68 90 0.00 80.15 0.00 -13.01 -9.13 0.00 0.00 0.00 58.01

Segment Leq : 58.01 dBA

Results segment # 3: QUEENSWAY-EB (day)

Source height = 1.50 m

ROAD (0.00 + 64.28 + 0.00) = 64.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	8	0.00	80.15	0.00	-13.22	-2.64	0.00	0.00	0.00	64.28

Segment Leq : 64.28 dBA

Results segment # 4: QUEENSWAY-EB (day)

Source height = 1.50 m

ROAD (0.00 + 57.80 + 0.00) = 57.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
68	90	0.00	80.15	0.00	-13.22	-9.13	0.00	0.00	0.00	57.80

Segment Leq : 57.80 dBA

Results segment # 5: MCLEOD (day)

Source height = 1.50 m

ROAD (0.00 + 68.48 + 0.00) = 68.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	68.48	0.00	0.00	0.00	0.00	0.00	0.00	68.48

Segment Leq : 68.48 dBA

Results segment # 6: ELGIN (day)

Source height = 1.63 m

ROAD (0.00 + 68.60 + 0.00) = 68.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	60	0.66	73.93	0.00	0.00	-5.33	0.00	0.00	0.00	68.60

Segment Leq : 68.60 dBA

Total Leq All Segments: 73.23 dBA

Results segment # 1: QUEENSWAY-WB (night)

Source height = 1.50 m

ROAD (0.00 + 56.90 + 0.00) = 56.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	8	0.00	72.55	0.00	-13.01	-2.64	0.00	0.00	0.00	56.90

Segment Leq : 56.90 dBA

Results segment # 2: QUEENSWAY-WB (night)

Source height = 1.50 m

ROAD (0.00 + 50.41 + 0.00) = 50.41 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
68	90	0.00	72.55	0.00	-13.01	-9.13	0.00	0.00	0.00	50.41

Segment Leq : 50.41 dBA

Results segment # 3: QUEENSWAY-EB (night)

Source height = 1.50 m

ROAD (0.00 + 56.69 + 0.00) = 56.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	8	0.00	72.55	0.00	-13.22	-2.64	0.00	0.00	0.00	56.69

Segment Leq : 56.69 dBA

Results segment # 4: QUEENSWAY-EB (night)

Source height = 1.50 m

ROAD (0.00 + 50.20 + 0.00) = 50.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
68	90	0.00	72.55	0.00	-13.22	-9.13	0.00	0.00	0.00	50.20

Segment Leq : 50.20 dBA

Results segment # 5: MCLEOD (night)

Source height = 1.50 m

ROAD (0.00 + 60.88 + 0.00) = 60.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	60.88	0.00	0.00	0.00	0.00	0.00	0.00	60.88

Segment Leq : 60.88 dBA

Results segment # 6: ELGIN (night)

Source height = 1.63 m

ROAD (0.00 + 61.07 + 0.00) = 61.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	60	0.57	66.32	0.00	0.00	-5.26	0.00	0.00	0.00	61.07

Segment Leq : 61.07 dBA

Total Leq All Segments: 65.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 73.23
(NIGHT): 65.65

STAMSON 5.0 NORMAL REPORT Date: 22-03-2012 08:22:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: east.te Time Period: Day/Night 16/8 hours
Description: EAST FACADE

Road data, segment # 1: QUEENSWAY-WB (day/night)

Car traffic volume : 44528/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 55000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: QUEENSWAY-WB (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 312.00 / 312.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: QUEENSWAY-WB (day/night)

Car traffic volume : 44528/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 55000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: QUEENSWAY-WB (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 327.00 / 327.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: MCLEOD (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: MCLEOD (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: QUEENSWAY-WB (day)

Source height = 1.50 m

ROAD (0.00 + 63.96 + 0.00) = 63.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	80.15	0.00	-13.18	-3.01	0.00	0.00	0.00	63.96

Segment Leq : 63.96 dBA

Results segment # 2: QUEENSWAY-WB (day)

Source height = 1.50 m

ROAD (0.00 + 63.75 + 0.00) = 63.75 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	80.15	0.00	-13.38	-3.01	0.00	0.00	0.00	63.75

Segment Leq : 63.75 dBA

Results segment # 3: MCLEOD (day)

Source height = 1.50 m

ROAD (0.00 + 63.25 + 0.00) = 63.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	68.48	0.00	-2.22	-3.01	0.00	0.00	0.00	63.25

Segment Leq : 63.25 dBA

Total Leq All Segments: 68.43 dBA

Results segment # 1: QUEENSWAY-WB (night)

Source height = 1.50 m

ROAD (0.00 + 56.36 + 0.00) = 56.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	72.55	0.00	-13.18	-3.01	0.00	0.00	0.00	56.36

Segment Leq : 56.36 dBA

Results segment # 2: QUEENSWAY-WB (night)

Source height = 1.50 m

ROAD (0.00 + 56.16 + 0.00) = 56.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	72.55	0.00	-13.38	-3.01	0.00	0.00	0.00	56.16

Segment Leq : 56.16 dBA

Results segment # 3: MCLEOD (night)

Source height = 1.50 m

ROAD (0.00 + 55.65 + 0.00) = 55.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	60.88	0.00	-2.22	-3.01	0.00	0.00	0.00	55.65

Segment Leq : 55.65 dBA

Total Leq All Segments: 60.84 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.43
(NIGHT): 60.84

STAMSON 5.0 NORMAL REPORT Date: 22-03-2012 08:20:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: west.te Time Period: Day/Night 16/8 hours
Description: WEST FACADE

Road data, segment # 1: QUEENSWAY-WB (day/night)

Car traffic volume : 44528/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 55000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: QUEENSWAY-WB (day/night)

Angle1 Angle2 : 62.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 312.00 / 312.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: QUEENSWAY-WB (day/night)

Car traffic volume : 44528/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 55000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: QUEENSWAY-WB (day/night)

Angle1 Angle2 : 62.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 327.00 / 327.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: MCLEOD (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: MCLEOD (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: QUEENSWAY-WB (day)

Source height = 1.50 m

ROAD (0.00 + 58.89 + 0.00) = 58.89 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
62	90	0.00	80.15	0.00	-13.18	-8.08	0.00	0.00	0.00	58.89

Segment Leq : 58.89 dBA

Results segment # 2: QUEENSWAY-WB (day)

Source height = 1.50 m

ROAD (0.00 + 58.68 + 0.00) = 58.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
62	90	0.00	80.15	0.00	-13.38	-8.08	0.00	0.00	0.00	58.68

Segment Leq : 58.68 dBA

Results segment # 3: MCLEOD (day)

Source height = 1.50 m

ROAD (0.00 + 63.25 + 0.00) = 63.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	68.48	0.00	-2.22	-3.01	0.00	0.00	0.00	63.25

Segment Leq : 63.25 dBA

Total Leq All Segments: 65.59 dBA

Results segment # 1: QUEENSWAY-WB (night)

Source height = 1.50 m

ROAD (0.00 + 51.29 + 0.00) = 51.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
62	90	0.00	72.55	0.00	-13.18	-8.08	0.00	0.00	0.00	51.29

Segment Leq : 51.29 dBA

Results segment # 2: QUEENSWAY-WB (night)

Source height = 1.50 m

ROAD (0.00 + 51.09 + 0.00) = 51.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
62	90	0.00	72.55	0.00	-13.38	-8.08	0.00	0.00	0.00	51.09

Segment Leq : 51.09 dBA

Results segment # 3: MCLEOD (night)

Source height = 1.50 m

ROAD (0.00 + 55.65 + 0.00) = 55.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	60.88	0.00	-2.22	-3.01	0.00	0.00	0.00	55.65

Segment Leq : 55.65 dBA

Total Leq All Segments: 58.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.59
(NIGHT): 58.00